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Internet Protocol for Aeronautical Exchange (iPAX-TF)

European Initiatives for IP Deployment

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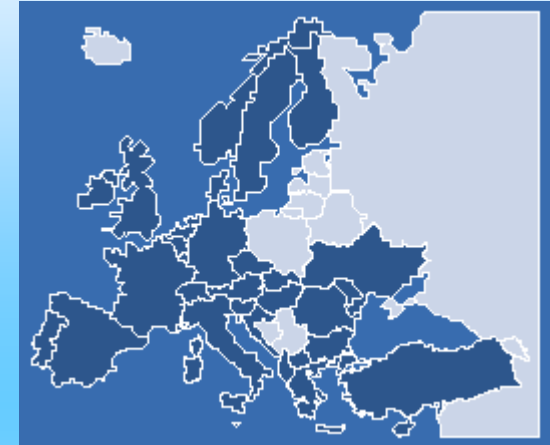
<http://www.eurocontrol.int/ipax>

Overview

- **The Internet Protocol for Aeronautical Exchange Task Force (iPAX-TF)**
- **Current survival of ground Air Traffic Management operations**
- **Our Problem Deploying IP between European Air Navigation Service Providers (ANSP)**
- **Validating a Target Architecture**
- **Deployment issues**

Eurocontrol & iPAX TF Essentials

- EUROCONTROL develops, co-ordinates and plans the implementation of short and long-term pan-European ATM strategies and their associated action plans throughout 31 European countries
- The iPAX-TF is tasked to define the architecture of a secure internet protocol (IP) network service in replacement of existing international X.25 services
- **The goal is to develop a mature migration plan for deployment as of 2005**



iPAX Task Force Essentials

- Established in July 2001 under the Eurocontrol European ATM Programme Communications domain
- Focuses on ground applications and services, making use of data, voice and mobile protocols
- Use industry standard communication products within the ATM sector
- To provide a secure internet protocol (IP) network service

Surviving

- Key manufacturers have stopped selling X.25 telecommunication switches
- Manufacturers will support existing equipment until end-2005
- ANSPs, Telecommunication Service Providers and resellers are stocking spare parts for until 2009
- Within Europe, all current ATM international services are under threat. The impact within other regions is unknown.



The iPAX Plan

- 1 Replace X.25 communication layers with the de-facto open industry standard : the internet protocol (IP) and it's security mechanisms
- 2 Upgrade the applications and systems to interface to a secure IP network
- 3 Maintain the application interface to the operational user to protect both application and ATM system investments

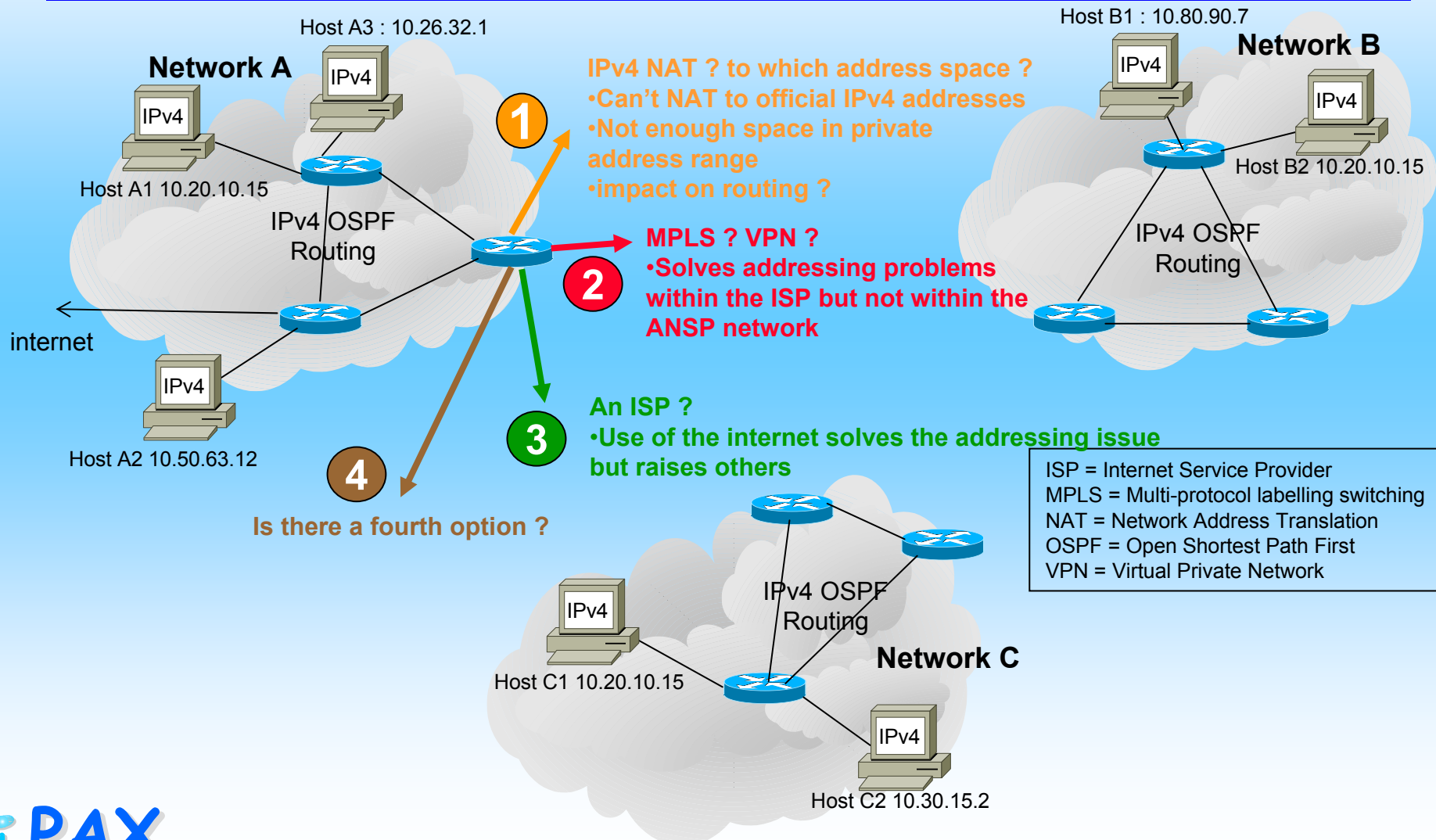
The internet protocol (IP)

- IP is omnipresent and mature, it has become a **COMMODITY**
- IP has been adopted world-wide (military, internet, banks, PC operating systems etc.)
- It is already widely used within the ATM sector
- IP devices are scalable and cost-effective
- Next generation IP (version 6) is being pushed by the European Commission (PR 29/01/02) and other global regions
- **Supports data, voice and mobility over secure encrypted links**

European IP Migration Status

- OLDI (European ATN AIDC equivalent) has been adapted to TCP/IP and pre-operational trials succeeded.
- Surveillance distribution is clearly converging to a common solution : ASTERIX format over IP.
- AFTN/CIDIN is to be migrated to ICAO AMHS (X.400) SARPs over TCP/IP. The recent availability of the European Communications Gateway (ECG) will enable this migration.
- Flow management positions are already IP enabled
- Route charging applications are in a migration process
- European AIS Database (EAD) is IP-based

Our IPv4 Problem: Conflicting addresses between private networks

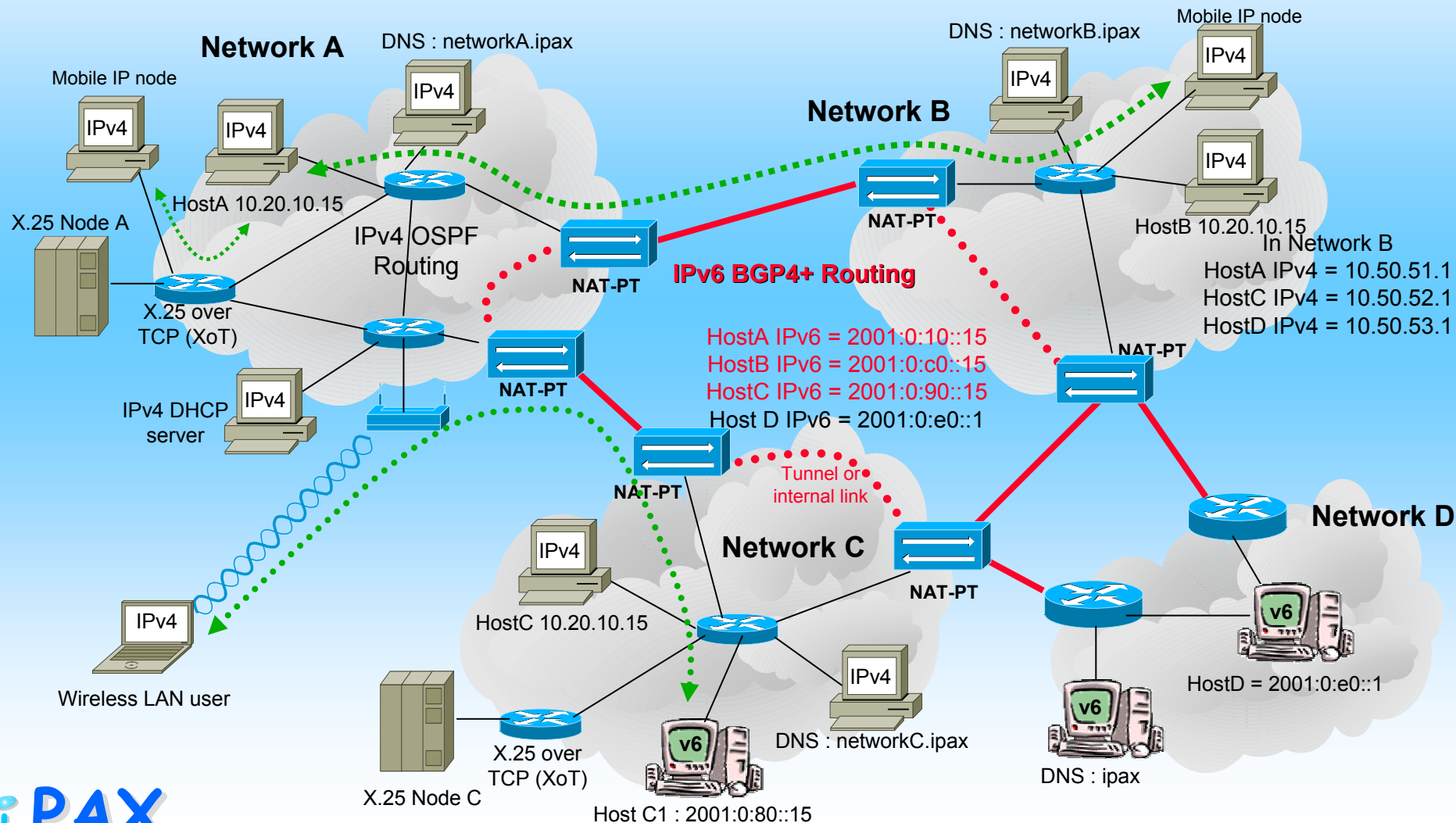


The 4th Option : Introduce IPv6

- Request globally unique address space from the European internet authority
- Build an IPv6 addressing scheme independent of ISPs, VPNs and topology
- No immediate changes within ANSP IPv4 private networks who can migrate to IPv6 at their own pace
- Deploy IPv6 for internetwork communications but scalable to cover the transition of all IPv4 nodes to IPv6
- Recommend IPv6 for end-systems but make use IPv4 to IPv6 address translation where necessary
- **Sanity check : IPv6 deployment should pick-up by 2005 prior our deployment**

Lab Trial Status

Environment : Linux, Solaris, AIX, Windows 2K, Windows95, Compaq, Cisco, Sun, IBM, Xircom



IPv6 Commercial Progression

- IPv6 is in Linux, AIX, Solaris, WinXP, Win2k, Cisco, 6Wind, Juniper etc. it's part of the 3G wireless standards
- Jul/02 : Mac OS Jaguar supports IPv6
 - Oct/02 : ARNES, DANTE, Juniper Networks and RedIRIS achieve to transfer 1215 terabit metres per second using standard TCP transfer over IPv6
 - Oct/02 : XS4ALL the first broadband provider in the Netherlands to make its network ready for IPv6
 - Dec/02 : Cisco releases IPv6 Phase II for the IOS
 - Jan/03 : MS-Media 9 Series IPv6 compliant
 - Feb/03 : NTT Europe launches European IPv6 service
 - Mar/03 : Checkpoint announces IPv6 compliant firewall

Next Steps (1) - WAN Trials

- Having completed ANSP staff training, the iPAX-TF has launched it's WAN trials :
 - 14 European sites connected via IPv6
 - 26 logical interconnections
 - planned IPv6 interconnections with NASA GRC
 - various lower media (VPN, Internet, LL, ISDN, MW)
 - Directory services
 - IP security (IPsec and firewalls)
 - X.25 over TCP/IP
 - OLDI over TCP/IP data exchange
 - ASTERIX over IP data exchange
 - AMHS over TCP/IP



Next Steps (2) - Open Tasks

- Increase awareness of growing X.25 maintenance costs, X.25 obsolescence by 2009 and the urgency to change as from 2005
- Market European IP deployment plans with international stakeholders
- Agree on a way-forward to manage deployment
- Who manages the post-deployment common issues:
 - Address space management for Europe (IPv4, IPv6)
 - Set-up and operation of
 - Routing
 - Directory services and systems management
 - Certificate Authority (CA) to establish secure IP connections
 - Release Management

Conclusion

- European ANSPs are being forced to plan a major change of their communications infrastructure to cope with the decline of X.25
- IPv6 is being selected as it :
 - is widely available and can interwork with IPv4
 - does not impose a radical change to existing IPv4 systems
 - resolves current interoperability problems
 - fits within an initial low-risk deployment option
 - is the target architecture